

### **REMARKS**

This is a full and timely response to the final Office Action of April 14, 2006.

Reexamination, reconsideration, and allowance of the application and all presently pending claims are respectfully requested.

Upon entry of this paper, claims 1, 2, 7, 8, 10, and 23-39 remain pending in this application, and claim 38 has been directly amended via the amendments set forth herein. It is believed that amendment of claim 38 adds no new matter to the present application.

In addition, the amendment of claim 38 has been presented in response to the outstanding 35 U.S.C. §112, second paragraph, rejection of this claim. Such a rejection was raised for the first time in the outstanding Office Action, and this paper is Applicant's first opportunity to respond to this rejection. Also, the outstanding Office Action indicates that claim 38, in its amended form, has already been examined by the Examiner. In particular, it is stated in the outstanding Office Action that the Examiner, for examination purposes, considers the term "can be" of claim 38 to be "is." See Page 2. Accordingly, a new search by the Examiner due to the amendment of claim 38 is not required, and Applicant respectfully requests that such amendment be entered pursuant to 37 C.F.R. §1.116.

### **Response to §112 Rejections**

Claim 38 presently stands rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Claim 38 has been amended herein thereby mooting the 35 U.S.C. §112, second paragraph, rejection of this claim. Accordingly, Applicant respectfully requests that the 35 U.S.C. §112, second paragraph, rejection of claim 38 be withdrawn.

## Response to §103 Rejections

In order for a claim to be properly rejected under 35 U.S.C. §103, the combined teachings of the prior art references must suggest all features of the claimed invention to one of ordinary skill in the art. See, e.g., *In Re Dow Chemical Co.*, 837 F.2d 469, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988), and *In re Keller*, 642 F.2d 413, 208 U.S.P.Q. 871, 881 (C.C.P.A. 1981).

### Claim 1

Claim 1 presently stands rejected under 35 U.S.C. §103 as allegedly being obvious over *Knowles* (U.S. Patent No. 6,446,107) in view of *Taewhan* ("Arithmetic Optimization using Carry-Save-Adders"). Claim 1 presently reads as follows:

1. An apparatus for performing addition of propagate, kill, and generate recoded numbers, said apparatus comprising:

circuitry configured to receive at least a first operand, a second operand, and a carry-in bit, the first and second operands comprising respective first and second propagate, kill, and generate recoded number representations of respective first and second binary operands;

a first carry-save adder configured to add said first operand and said second operand to generate a third propagate, kill, and generate recoded number representation and a carry-out bit; and

a modified carry-save adder configured to receive the third propagate, kill, and generate recoded number representation from the first carry-save adder and the carry-in bit from the circuitry, add the separate propagate, kill, and generate bits of the third propagate, kill, and generate recoded number representation with the carry-in bit to generate a sum value and a carry value, wherein the circuitry provides the carry-out bit from the first carry-save adder at a first output and the carry value from the modified carry-save adder at a second output,

wherein each of the propagate, kill, and generate recoded number representations has a respective kill bit, a respective propagate bit, and a respective generate bit that are indicative of a respective coded logical value having a plurality of bits, ***wherein the kill bit, if set, indicates that each of the bits of the respective coded logical value is not set***, wherein the propagate bit, if set, indicates that only one of the bits of the respective coded logical value is set, and wherein the generate bit, if set, indicates that each of the bits of the respective coded logical value is set. (Emphasis added).

Applicant respectfully asserts that the combination of *Knowles* and *Taewhan* fails to suggest at least the features of claim 1 highlighted hereinabove. Therefore, the 35 U.S.C. §103 rejection of claim 1 is improper and should be withdrawn.

In rejecting claim 1, it is asserted in the Office Action that *Knowles* discloses:

“an apparatus (e.g. abstract and col. 9 line 59 – col. 10 line 10) for performing addition of propagate, kill, and generate recoded numbers... wherein the kill bit, if at a particular binary value (e.g. col. 10, lines 17-21), indicates that each of the bits of the respective coded logical value is not (set)...”

However, Applicant observes that there is nothing in the cited art to suggest that the alleged “kill bit,” if set, indicates that each of the bits of the alleged “coded logical value” is not set. In this regard, the alleged “kill bit” is defined as  $a_i \text{ OR } b_i$ . See column 9, line 67. Thus, if the alleged “kill bit” is low, as suggested in the Office Action, then it appears that bits  $a$  and  $b$  each have the same value (*i.e.*, low) as the alleged “kill bit,” and, if the alleged “kill bit” is high, at least one of the bits  $a$  or  $b$  has the same value (*i.e.*, high) of the alleged “kill bit.” However, claim 1 specifically requires the “kill bit,” if set, to be *different* than each of the bits of the “respective coded logical value.” In particular, claim 1 recites “wherein the kill bit, *if set*, indicates that each of the bits of the respective coded logical value is *not set*.” (Emphasis added).

In responding to Applicant’s arguments in the Amendment filed on February 2, 2006, it is asserted in the outstanding Office Action that:

“Applicant’s arguments filed 02/02/2006 have been fully considered but they are not persuasive.

a. The applicant argues in pages 9-13 for all claims that the cited reference fails to disclose generally and particularly the kill bit, if set, indicates that each of the bits of the respective code logical value is not set as cited in the claim.

The examiner respectfully submits that the cited reference clearly disclose the above feature as seen in Figures 2-3 wherein  $k_i$  is OR of  $a_i$  and  $b_i$ , thus mathematically,  $k_i$  is  $\text{bar}(a_i + b_i)$  or is  $\text{bar}(a_i) * \text{bar}(b_i)$

which indicates that each of the bits of respective code logical value of  $a_1$  and  $b_1$  is not set.”

The foregoing Office Action allegations appear to be based on the fact that the value on the output connection of OR gate 61 is labeled “ $\bar{K}_1$ ” in Figure 2. Regardless of how this value is labeled, it does not constitute a “kill bit,” as defined by claim 1. In this regard, the bit on the output connection of OR gate 61, regardless of the states of the input bits  $a_1$  and  $b_1$ , is always the same as at least one of the input bits  $a_1$  or  $b_1$ . In particular, the value on output connection of OR gate 61 is  $a_1 \text{ OR } b_1$ , and such a value cannot constitute a “kill bit,” for at least the reasons set forth above.

Moreover, if the output value of OR gate 61 is referred to as “ $\bar{K}_1$ ,” then a bit value “ $K_1$ ” may indeed be defined as “ $\bar{K}_1$ ,” as alleged in the Office Action. However, such a hypothetical bit value “ $K_1$ ” does not appear to be generated by the circuitry of Figures 2 or 3 of *Knowles* nor by the alleged “apparatus” purportedly suggested by the combination of *Knowles* and *Taewhan*. In this regard, the output of OR gate 61 is not “ $\bar{K}_1$ ” but is instead  $a_1 + b_1$ . Further, there is nothing in the cited art to suggest that the hypothetical bit value “ $K_1$ ” (*i.e.*,  $\bar{K}_1$ ) is generated by any other component of the alleged “apparatus.” Thus, Applicant submits that the alleged “apparatus” is *not* configured to “generate” the alleged “kill bit” if the alleged “kill bit” is assumed to be equal to “ $\bar{K}_1$ ,” as alleged in the Office Action. For at least the foregoing reasons, Applicant respectfully asserts that the Office Action fails to establish that the cited art teaches circuitry configured to “generate” PKG (propagate, kill and generate) recoded number representations that respectively have propagate, kill, and generate bits, “wherein the kill bit, if set, indicates that each of the bits of the respective coded logical value is not set,” as described by claim 1.

For at least the above reasons, Applicant respectfully asserts that the Office Action fails to establish a *prima facie* case of obviousness with respect to each feature of claim 1. Therefore, the 35 U.S.C. §103 rejection of claim 1 should be withdrawn.

**Claims 2, 23-25, 27-29, 33, and 34**

Claim 2 presently stands rejected in the Office Action under 35 U.S.C. §103 as allegedly obvious over *Knowles* in view of *Taewhan* and in view of *Miller* (U.S. Patent No. 5,706,323). Further, claims 23-25, 27-29, 33, and 34 presently stand rejected in the Office Action under 35 U.S.C. §103 as allegedly being anticipated by *Knowles* in view of *Taewhan*. Applicant submits that the pending dependent claims 2, 23-25, 27-29, 33, and 34 contain all features of their respective independent claim 1. Since claim 1 should be allowed, as argued hereinabove, pending dependent claims 2, 23-25, 27-29, 33, and 34 should be allowed as a matter of law for at least this reason. *In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988). Furthermore, these dependent claims recite patentably distinct features and/or combinations of features that make them allowable, notwithstanding the allowability of their base claim 1.

For example, claim 33 recites “wherein only a respective one of the kill, propagate, and generate bits of each possible propagate, kill, and generate recoded number representation can be set.” Applicant respectfully asserts that such features are not suggested by the cited art. Accordingly, the 35 U.S.C. §103 rejection of claim 33 is improper and should be withdrawn, notwithstanding the allowability of independent claim 1.

In this regard, it is alleged in the Office Action that:

“Re claim 33, *Knowles* further discloses in Figure 3 only one of the kill, propagate, and generate bits of each possible propagate, kill, and generate recoded number representation can simultaneously be at the particular binary value (e.g. col. 9 line 59- col. 10 line 10).”

Applicant respectfully traverses the Office Action assertion that the cited section of *Knowles* (i.e., column 9, line 59, through column 10, line 10) suggests each feature of claim 33. In this regard, there is at least one possible state of the input  $a_i$  and  $b_i$  for which multiple ones of the alleged kill, propagate, and generate bits would be set according to the formulas specified at column 9, lines 64-66. Thus, there is at least one possible PKG recoded number representation in which multiple kill, propagate, and generate bits would be set, and the cited art, therefore, fails to suggest at least “wherein **only** a respective **one** of the kill, propagate, and generate bits **of each possible** propagate, kill, and generate recoded number representation can be set,” as described by claim 33. (Emphasis added). Accordingly, the Office Action fails to establish a *prima facie* case of obviousness with respect to the features of claim 33.

### Claim 7

Claim 7 presently stands rejected under 35 U.S.C. §103 as allegedly being obvious over *Knowles* in view of *Taewhan*. Claim 7 presently reads as follows:

7. A method for processing propagate, kill, and generate representations of respective first and second binary operands, comprising:

receiving a carry-in value and a first and a second propagate, kill, and generate representation of respective first and second binary operands;

generating a third propagate, kill, and generate representation and a carry-out value responsive to the first and second propagate, kill, and generate representations;

logically combining the third propagate, kill, and generate representation with the carry-in value to generate a sum value and a carry value; and

providing the carry-out value, the carry value, and the sum value as a result of the addition of the first and second propagate, kill, and generate representations,

wherein each of the propagate, kill, and generate recoded number representations has a respective kill bit, a respective propagate bit, and a respective generate bit that are indicative of a respective coded logical value having a plurality of bits, **wherein the kill bit, if set, indicates that each of the bits of the respective coded logical value is not set**, wherein the propagate bit, if set, indicates that only one of the bits of the respective coded logical value is set, and wherein the generate bit, if set, indicates that each of the bits of the respective coded logical value is set. (Emphasis added).

For at least reasons similar to those set forth hereinabove in the arguments for allowance of claim 1, Applicant respectfully asserts that the cited art fails to suggest at least the features of claim 7 highlighted above. Accordingly, the 35 U.S.C. §103 rejection of claim 7 is improper and should be withdrawn.

**Claims 8, 10, 30, 32, 37, and 38**

Claims 8, 30, 32, 37, and 38 presently stand rejected in the Office Action under 35 U.S.C. §103 as allegedly obvious over *Knowles* in view of *Taewhan*. Further, claim 10 presently stands rejected in the Office Action under 35 U.S.C. §103 as allegedly being obvious over *Knowles* in view of *Taewhan* and in view of *Miller*. Applicant submits that the pending dependent claims 8, 10, 30, 32, 37, and 38 contain all features of their respective independent claim 7. Since claim 7 should be allowed, as argued hereinabove, pending dependent claims 8, 10, 30, 32, 37, and 38 should be allowed as a matter of law for at least this reason. *In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988). Furthermore, these dependent claims recite patentably distinct features and/or combinations of features that make them allowable, notwithstanding the allowability of their base claim 7.

For example, claim 38 recites “wherein only a respective one of the kill, propagate, and generate bits of each possible propagate, kill, and generate recoded number representation is set.” Applicant respectfully asserts that such features are not suggested by the cited art. Accordingly, the 35 U.S.C. §103 rejection of claim 38 is improper and should be withdrawn, notwithstanding the allowability of independent claim 7.

### Claim 35

Claim 35 presently stands rejected under 35 U.S.C. §103 as allegedly being obvious over *Knowles* in view of *Taewhan*. Claim 35 presently reads as follows:

35. An apparatus for performing addition of propagate, kill, and generate recoded numbers, said apparatus comprising:

circuitry configured to receive an operand defining a logical value encoded in propagate, kill, and generate (PKG) form such that the operand has a propagate bit, a generate bit, and a kill bit, wherein the logical value, when decoded into a non-PKG form, has a plurality of bits, ***wherein the kill bit, if set, indicates that none of the bits of the logical value are set***, wherein the propagate bit, if set, indicates that only one of the bits of the logical value is set, and wherein the generate bit, if set, indicates that two bits of the logical value are set; and

a carry save adder configured to add the operand in PKG form to a carry bit without decoding the operand from PKG form. (Emphasis added).

For at least reasons similar to those set forth hereinabove in the arguments for allowance of claim 1, Applicant respectfully asserts that the cited art fails to suggest at least the features of claim 35 highlighted above. Accordingly, the 35 U.S.C. §103 rejection of claim 35 is improper and should be withdrawn.

### Claims 36 and 39

Claims 36 and 39 presently stand rejected in the Office Action under 35 U.S.C. §103 as allegedly obvious over *Knowles* in view of *Taewhan*. Applicant submits that the pending dependent claims 36 and 39 contain all features of their respective independent claim 35. Since claim 35 should be allowed, as argued hereinabove, pending dependent claims 36 and 39 should be allowed as a matter of law for at least this reason. *In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988). Furthermore, these dependent claims recite patentably distinct features and/or combinations of features that make them allowable, notwithstanding the allowability of their base claim 35.



For example, claim 39 recites “wherein a single one of the kill, propagate, and generate bits is set by the circuitry regardless of the logical value defined by the operand.” Applicant respectfully asserts that such features are not suggested by the cited art. Accordingly, the 35 U.S.C. §103 rejection of claim 39 is improper and should be withdrawn, notwithstanding the allowability of independent claim 35.

#### **Allowable Subject Matter**

Claims 26 and 31 have been indicated as allowable by the outstanding Office Action if such claims are rewritten to include the limitations of their respective base claims. For at least the reasons set forth hereinabove, Applicant submits that the respective base claims 1 and 7 are allowable and claims 26 and 31 are, therefore, allowable as a matter of law. *In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988). Accordingly, Applicant respectfully submits that claims 26 and 31 are allowable in their present form.


**CONCLUSION**

Applicant respectfully requests that all outstanding objections and rejections be withdrawn and that this application and all presently pending claims be allowed to issue. If the Examiner has any questions or comments regarding Applicant's response, the Examiner is encouraged to telephone Applicant's undersigned counsel.

Respectfully submitted,

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